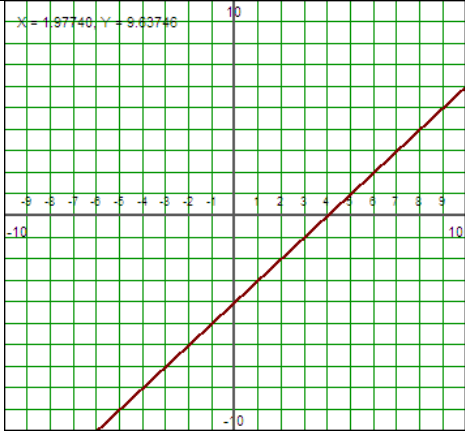
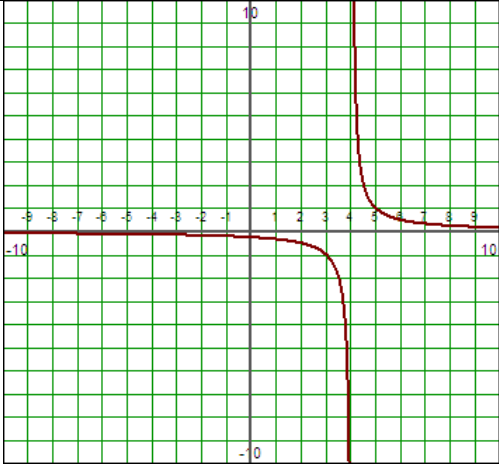


Investigating Rational Functions

Instructions:

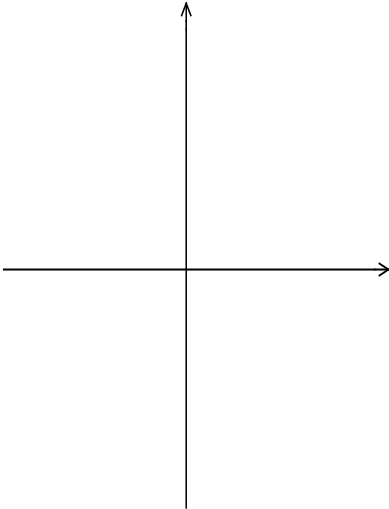
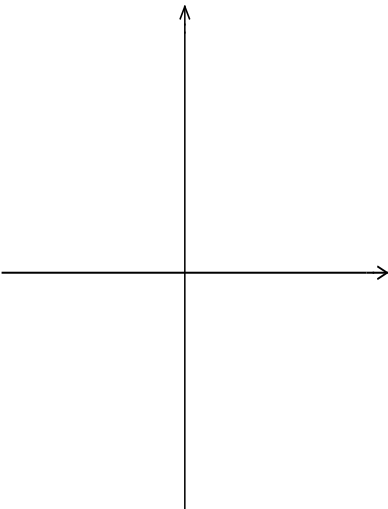
You will be looking at a function and its reciprocal. Use Graphcalc to get an idea of the shape and important points of function. You will then complete the characteristics of both functions and try to make connections based on your results.

Sample Exercise:

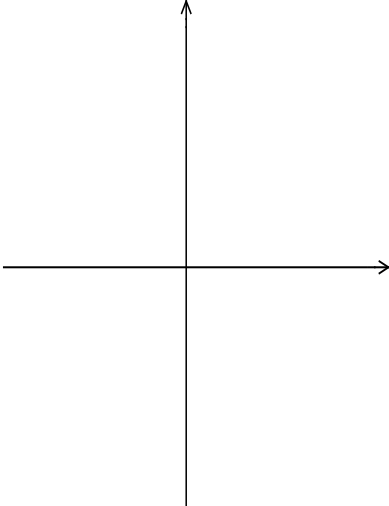
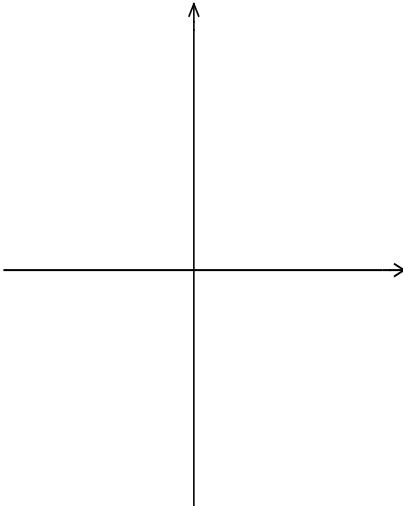
Characteristics	Function: $g(x) = x - 4$	Rational function: $f(x) = \frac{1}{x-4}$
Graph (use graphing technology for this)		
Domain (put this in set notation)	$\{x \in R\}$	$\{x \in R \mid x \neq 4\}$
Range (put this in set notation)	$\{y \in R\}$	$\{y \in R \mid y \neq 0\}$
Positive interval	$x > 4$	$x > 4$
Negative interval	$x < 4$	$x < 4$
Vertical asymptote(s) (give the equation)	None	$x = 4$
Horizontal asymptote (give the equation)	None	$y = 0$
Interval(s) of increase	$\{x \in R\}$	None
Interval(s) of decrease	None	$\{x \in R \mid x \neq 4\}$
Quadrants (In which quadrant does the graph begin? Finish?)	Start: Quadrant 3 Finish: Quadrant 1	Start: Quadrant 3 Finish: Quadrant 1

Investigating Rational Functions –Your Turn!

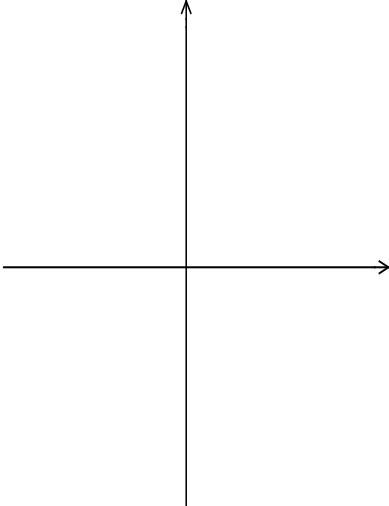
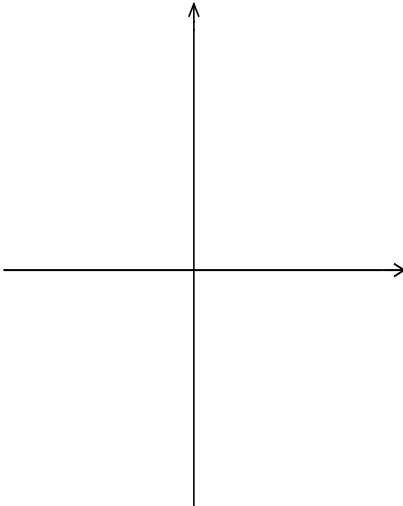
1.

Characteristics	Function: $g(x) = x+6$	Rational function: $f(x) = \frac{1}{x+6}$
Graph(use graphing technology for this)		
Domain (put this in set notation)		
Range (put this in set notation)		
Positive interval		
Negative interval		
Interval(s) of increase		
Interval(s) of decrease		
Vertical asymptote(s) (give the equation)		
Horizontal asymptote (give the equation)		
Quadrants (In which quadrant does the graph begin? Finish?)		

2.

Characteristics	Function: $g(x) = x^2$	Rational function: $f(x) = \frac{1}{x^2}$
Graph(use graphing technology for this)		
Domain (put this in set notation)		
Range (put this in set notation)		
Positive interval		
Negative interval		
Interval(s) of increase		
Interval(s) of decrease		
Vertical asymptote(s) (give the equation)		
Horizontal asymptote (give the equation)		
Quadrants (In which quadrant does the graph begin? Finish?)		

3.

Characteristics	Function: $g(x) = x^2 - 16$	Rational function: $f(x) = \frac{1}{x^2 - 16}$
Graph (use graphing technology for this)		
Domain (put this in set notation)		
Range (put this in set notation)		
Positive interval		
Negative interval		
Interval(s) of increase		
Interval(s) of decrease		
Vertical asymptote(s) (give the equation)		
Horizontal asymptote (give the equation)		
Quadrants (In which quadrant does the graph begin? Finish?)		

4. Making connections:

Look at each pair of functions in your charts.

- Do the quadrants of $g(x)$ and $f(x)$ relate? If so, how? How would knowing the quadrants of a linear function allow you to graph the rational function? Test your theory by creating more examples using Graphcalc. Is your reasoning valid?
- Look at the other characteristics. Are there any other relationships between $g(x)$ and $f(x)$?
- How can you find the vertical asymptote without graphing the function? Does this work for every rational function?
- What can you say about the horizontal asymptote for a rational function? Is this true for every rational function?